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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,210	05/14/2007	Christopher Jones	1022702-000318	6018
21839 7590 06/10/2009 BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404				
EXAMINER BUCKLEY, AUDREA				
ART UNIT 4131		PAPER NUMBER		
NOTIFICATION DATE 06/10/2009		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

Office Action Summary

Application No.

10/589,210

Applicant(s)

JONES ET AL.

Examiner

AUDREA BUCKLEY

Art Unit

4131

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of the Claims

Claims 1-28 are cancelled and therefore not considered. Claims 29-43 are examined in this office action.

The instant invention is drawn to a particular biocidally active phosphonium compound which is embedded in a matrix substrate such that the total composition serves as a method and product for reducing micro-organisms in an industrial system.

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It does not identify the foreign application for patent or inventor's certificate on which priority is claimed pursuant to 37 CFR 1.55, and any foreign application having a filing date before that of the application on which priority is claimed, by specifying the application number, country, day, month and year of its filing.

The declaration makes references to a French National Stage Application, when it appears from the file a GB application should be referenced.

Claim Rejections - 35 USC § 112, Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 29 and 36-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The subject matter of independent claim 29 relates to a phosphonium compound which is "embedded in a matrix substrate", whereby the matrix substrate is defined as having a melting point of between 5 and 80° C. By this definition, matrix substrates which are liquid at ambient temperatures are included, which means that the subject matter of claim 1 extends to phosphonium compounds, which are present as either solutions or mixtures or dispersions in a liquid substrate. It follows, that the definition "embedded in a matrix substrate" clearly is not limited to a situation in which the compound firmly is enclosed and fixed in a solid substrate, rather the definition extends to situations in which the compound is mixed with or dissolved in a liquid substrate. Because the meaning of "embedded in a matrix substrate" as used in the claims and in the description therefore appears to be ambiguous, claims 29 and 36-40 are not clear.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 29-31, 35, 38, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper *et al.* (EP 0215562 A1).

Cooper *et al.* teach biocidal mixtures comprising tris hydroxymethyl organophosphine or tetrakis hydroxymethyl phosphonium biocides and a surfactant, where the compositions claimed are useful for controlling micro-organisms through the implementation of these ingredients into products for various industrial applications. Although Cooper *et al.* teach relevant biocidal mixture components, Cooper *et al.* do not

expressly limit the physical characteristics of a matrix substrate, which contains the biocidal active agents, to those of a melting point of a value between 5° and 80° C, nor do Cooper *et al.* limit the identity of the matrix substrate to one which is characteristically soluble in water at a temperature between 5° and 100° C.

Claim 29 is drawn to a specific phosphonium compound embedded in a matrix substrate where the matrix substrate exhibits each a melting point and solubility within a given temperature range. Similarly, Cooper *et al.* claim a biocidally active mixture comprised of analogous components (column 18, claim 12, line 8). While claim 29 does not specify the identity of preferred matrix substrates, but, rather, specifies the properties of possible matrix substrate identities, one of ordinary skill in the art at the time the invention was made would be able to substitute any polyhydric matrix compound in order to control the properties of the composition. For example, and in regard to claim 30, Cooper *et al.* claim tetrakis(hydroxymethyl) phosphonium sulphate (column 17, claim 3, line 21) and disclose polyhydric alcohols or ketones as solvents facilitating homogenous dispersal (column 7, line 8). Also, in regard to claim 31, Cooper *et al.* claim tetrakis(hydroxymethyl) phosphonium phosphate (column 17, claim 3, line 22).

Furthermore and regarding claim 35, although Cooper *et al.* do not explicitly state that the role of the polyhydric alcohols or ketones is one of acting as a matrix in which another substance such as a phosphonium compound can reside, the inherent physical properties and role of the polyhydric alcohols and ketones result in a function analogous to the one instantly claimed (column 7, line 8). On account of the role of polyhydric

alcohols or ketones as solvents in systems comprising organophosphine compounds, surfactants, and optional additives, one of ordinary skill in the art would be motivated to continue using these known agents in combination with biocidal agents. Consequently, one of ordinary skill in the art at the time the invention was made would find such combinations to be *prima facie* obvious and would expect success both in terms of antimicrobial activity as well as composition stability and efficacy upon optimization of the known agents in combination with one another.

Regarding claim 38 which lists possible matrix substrate groups, Cooper *et al.* disclose surfactants including nonionic ethoxylated compounds, ethylene oxide/propylene oxide copolymers, among other surface active agents (column 1, line 40 through column 2, line 4). Clearly, these surfactants coincide with the possible substrate groups listed in claim 38, and selection of representative species from the variety of groups listed would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made when in consideration of the prior art which discloses various species.

Instant claims 40-42 are drawn to a method and corresponding formulation for micro-organism reduction in industrial applications, where optional additives such as scale inhibitors may be added to the formulation. The prior art shows claimed compositions comprising biocides, scale inhibitors, oxygen scavengers, etc (column 6, line 52) which are used to treat industrial water systems, for example (column 18, claim 13, line 14; column 18, claim 16, line 26; column 18, claim 11; line 5), through contact (column 10, line 3). The inventive concept of these claims lacks novelty, and the

literature precedents demonstrate analogous art for an identical application, both formulation and method, for controlling microorganisms.

Because in the context of the present application the term "embedded in a matrix substrate" includes mixtures of the phosphonium compound and the substrate, the subject matter as claimed lacks novelty. Further, the components as claimed would have been *prima facie* obvious in view of the prior art to try in combination with one another.

Claims 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper *et al.* (EP 0215562 A1) and further in view of Guritza (US00655228B2).

In regard to claim 39, which is drawn to the identity of the matrix substrate being a mixture of two or more of the polyhydric compounds, Cooper *et al.* do not suggest explicitly the combination of these compounds.

However, Guritza teaches a bio-supportive medium and methods of making and using the medium which comprises a degradable material as well as at least one bio-limiting agent dispersed in the biodegradable material. Further, these compounds are used to treat chemical corrosion for a variety of purposes, analogous to those mentioned in the specification of the instant invention. Specifically, Guritza discloses polyhydric amines and alcohols as preparation components for a structural component of the medium.

So, based on this successful precedent in the art, one of ordinary skill at the time the invention was made would have been motivated to combine these known features

with expected success of a composition physically stabilized in part by the polyhydric compounds which encompass a biocidal active ingredient. As MPEP 2144.06 states,

"It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

So, it would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to combine the polyhydric compounds, such as the alcohols which were known in the art in an analogous composition, in order to optimize the physical properties of the final composition.

See MPEP 2144.06

"It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) DONE

Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper *et al.* as applied to claims 29-31, 34, 35, and 38-43 above, and further in view of Zakikhani (EP 0451664 A1) and by the CRC Handbook of Food Additives.

Claims 32 and 33 are drawn to the identity of the nitrogen containing component of a phosphonium compound listed in claim 1, where the nitrogen containing component is limited to urea, melamine, guanidine, or dicyandiamide.

Generally, Zakikhani teaches a fabric treatment composition which implements tetra kis (hydroxymethyl) phosphonium (THP) compounds or precondensates thereof with urea. Specifically, the treatment processes entail the impregnation of the fabric with a solution of the chemicals, followed by a curing process. Therefore, the chemical components and physical properties of the treatment materials are relevant to that particular function of the composition. On account of the chemical components of Zakikhani's composition, this composition remains relevant to the instantly disclosed compound which utilizes the same components.

Specifically, tetra kis (hydroxymethyl) phosphonium compounds or precondensates thereof are added to a nitrogen compound, where "the nitrogen compound is preferably one with at least two NH groups (such as 2-4), but advantageously contains two NH or especially two NH₂ groups. ...Examples of suitable nitrogen compounds are biuret, guanidine, melamine, and methylolated melamines, but urea is the preferred species for the purposes of this invention, especially in the absence of melamine or a methylolated melamine. The nitrogen compound is preferably urea whenever it is present in the precondensate" (page 4, line 21). Additionally, it is specified that "in a preferred embodiment of this invention, the solution contains a precondensate of THP salt, e.g. chloride or sulphate..." (page 4, line 28). Additionally, Zakikhani recognize that the nitrogen containing polymer is soluble in water, for example, quantified by 10g/l at 20° C (page 2, line 54). Regarding the water solubility of the matrix substrate, where the matrix substrate is a polyhydric alcohol, one of ordinary skill in the art would recognize that polyhydric alcohols are generally water-

soluble, hygroscopic materials that exhibit a moderate viscosity at high concentrations in water. Also, as the CRC Handbook of Food Additives acknowledges, the trend is that as molecular weight increases, the melting point generally increases with respect to polyhydric alcohols.

So, since Zakikhani demonstrates successful addition of nitrogen-containing compounds to THP compounds, one of ordinary skill in the art would have expected continued success upon the addition of this precedent to that shown by Cooper *et al.* in which the addition of THP compounds into a matrix substrate are utilized for pharmaceutical applications. So, it is reasonable to suppose that, although a particular matrix substrate is not disclosed regarding claims 32 and 33, one of ordinary skill in the art at the time the invention was made would find the selection of a matrix substrate to be *prima facie* obvious in view of the prior art as well as the known properties of possible substrates, including but not limited to polyhydric alcohols.

Claims 34 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper *et al.* (EP 0215562 A1) and further in view of Fidoe *et al.* (WO 99/17614).

Claim 34 is drawn to the phosphonium compound as claimed, wherein the matrix substrate has a melting point of between the values of 20° and 70° C, optionally 60° C .

Fidoe *et al.* disclose solid compositions comprising tris hydroxymethyl organophosphine or tetrakis hydroxymethyl phosphonium biocides which are either coated onto solid acids and thus bound to the surface, or absorbed therein, meaning that

the THP biocides are enclosed in the surrounding solid acid substrate (page 1, paragraph 5). The solid acids have melting points above 50° C, preferably above 60° or 70° C. In paragraph 2 on page 2, a list of acids is given, which include water soluble acids including angelic, lactic, or tiglic acid (page 2, paragraph 2) with melting points of 45°, 53°, and 63°, respectively.

Furthermore and regarding instant claim 43, the resulting compositions are compacted into various shapes and used, under optional addition of further active ingredients, for the treatment of industrial water systems (page 4, paragraph 6). Presumably, the various shapes cited in the prior art are analogous to the instantly claimed shapes of sticks/candles, beads, pellets, bricks, shavings, flakes, or pills.

Due to the established biocidal success upon combination of these agents, one of ordinary skill in the art would have expected continued success upon the combination. Moreover, it would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to substitute the variety of instantly claimed phosphonium groups for the known solid phosphonium-derived biocides in combination with a variety of acids since these phosphonium functional groups would have been considered to be known chemical equivalents.

Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper *et al.* as applied to claims 29-31, 34, 35, and 38-43 above, and further in view of Heath *et al.* (US007196040B2) and Kung *et al.* (US20030207270A1).

Claims 36 and 37 of the instant invention are drawn to the polyhydric compound of the phosphonium compound of claim 29, where the polyhydric compound identity is a polyethylene glycol with a molecular weight of above 600 or where the identity is polyethylene glycol 8000.

Heath *et al.* disclose polymeric material for the release of chemicals in a fluid environment, where the polymeric material forms a matrix, from which the chemical is released. Chemicals for release expressly include scale inhibitors and/or biocides. The example number 3 disclosed by Heath *et al.* specifies tetrakis hydroxymethyl phosphonium sulfate as a biocidal chemical, and the compositions disclosed are used to treat industrial fluid systems like oil field wells. Although poly(ethylene oxide) is mentioned among a list of polymers, Heath *et al.* teach that the polymeric material preferably should be permeable. In example 3, PP/HDPE is used as a polymer matrix for the release of tetrakis hydroxymethyl phosphonium sulfate (column 9, line 10).

From the teaching of Heath *et al.*, the subject matter of claims 36 and 37 differs in that a water soluble polyethylene glycol with a molecular weight of above 600, in particular, polyethylene glycol 8000 is used as a matrix substrate. The technical effect brought about by this distinguishing feature is, that the phosphonium compounds can be dosed into systems requiring aeration without impacting the performance of oxygen scavengers while biocidal performance of the phosphonium compounds is not negatively affected, as supported by the examples. As this distinguishing feature is not preceded by the prior art, the subject matter of claims 36 and 37 involves an inventive step, however, this inventive step remains obvious to try in view of the prior art. For

example, Kung *et al.* teach a genomic-based approach to herbal compositions wherein PEG-8000 is utilized as an inactive component serving as a substrate for stabilization of active components (page 37, column 1, line 3). Additionally, one of ordinary skill in the art would be motivated to implement phosphonium derived compounds into this particular matrix for biocide applications since a reasonable degree of success had been shown in the prior art for the development and use of analogous systems.

Therefore, Heath *et al.* suggest that the product to be delivered is released by permeation, and one of ordinary skill in the art at the time the invention was made would have recognized that implementation of a particular phosphonium compound into a polymeric material matrix for biocidal chemical release was *prima facie* obvious in view of the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AUDREA BUCKLEY whose telephone number is (571)270-1336. The examiner can normally be reached on Monday-Friday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Nolan can be reached on (571) 272-0867. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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